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EXAMINER

CANTELMO, GREGG

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 10/24/2003

4

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/001,994

Applicant(s)

NOH ET AL.

Examiner

Gregg Cantelmo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## **DETAILED ACTION**

### ***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Information Disclosure Statement***

2. The information disclosure statement filed December 5, 2001 has been placed in the application file and the information referred to therein has been considered as to the merits.

### ***Drawings***

3. The drawings received December 5, 2001 are acceptable for examination purposes.

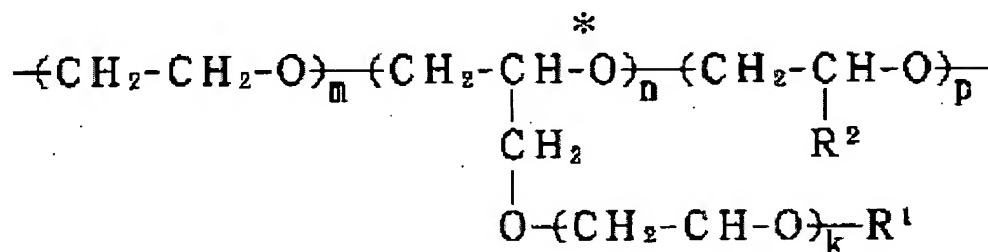
### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 2, 5, 7, 10, 11, 14, 17, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 11-039940 A (JP '940).

JP '940 discloses a polymeric gel electrolyte and lithium battery comprising a polymer represented by formula



(see top of page 2), a cross-linking agent including argents having the formula 2 (see paragraph [0012]) and an electrolytic solution composed of a lithium salt (paragraph [0016]) and a non-aqueous solvent (paragraph [0018]). The mol ratio of subscript m (identical to the instant claim polymer component having the subscript x), is 0.5-0.95 mol. The mol ratio of subscript n (identical to the instant claim polymer component having the subscript y), is 0.05-0.5 mol. The mol ratio of subscript p (identical to the instant claim polymer component having the subscript y), is 0-0.1 mol (see claim 1 of JP '940). k=1-4 which includes a value of 2 (as applied to claims 1, 7, 10, 17 and 23).

Additionally, with respect to the product claims: “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (citations omitted).

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"The Patent Office bears a lesser burden of proof in making out a case of prima facie obviousness for product-by-process claims because of their peculiar nature" than when a product is claimed in the conventional fashion. In re Fessmann, 489 F.2d 742, 744, 180 USPQ 324, 326 (CCPA 1974). Once the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. In re Marosi, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). See MPEP section 2113.

The polymer has a molecular weight from 100,000 to 4 million (claim 1).

The organic solvent includes materials such as ethylene carbonate, propylene carbonate, etc (paragraph [0024]). The lithium salt is lithium perchlorate as shown in the examples (as applied to claims 5 and 14).

The polymer is formed on a support film, polymerized and removed from the support film (paragraph [0030]-[0031] as applied to claim 21).

The differences between claims and JP '940 are that JP '940 does not explicitly define the R2 group as defined in formula 1 (as applied to claims 1, 7, 10, 17 and 23) or of the amount of polymer relative to the polymer precursor (claims 2 and 11).

JP '940 teaches that the R2 group contains a crosslinking reaction nation machine (claim 1) such as an ethylene unsaturated machine (claim 2 and paragraphs [0010] and [0013]).

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The apparent criticality of the R2 group lies in the unsaturated component of the monomer therein for crosslinking purposes. The ethylene component R2 group of JP '940 provides the same function and has the same terminal unsaturation as the monomer constituent in the claims and one of ordinary skill in the art would have found it obvious to use any number of ethylene unsaturated monomers such as the ones identified in paragraph [0013] or similar monomers as providing equivalent means for a cross-linking site for the terpolymer of JP '940.

The claimed substituent possesses a similar structure to that of those ethylene unsaturated machines of JP '940. Accordingly it would have additionally been obvious to one of ordinary skill in the art to replace the ethyl substituent in the polymer of JP '940 with a homologue such as a propyl in view of their closely related structures and the resulting expectation of similar properties.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '940 by selecting the R2 substituent of JP '940 to be the substituent defined in the instant claims since the substituents possess similar structure to that of those ethylene unsaturated machines of JP '940. Accordingly it would have additionally been obvious to one of ordinary skill in the art to replace the ethyl substituent in the polymer of JP '940 with a homologue such as a propyl in view of their closely related structures and the resulting expectation of similar properties.

The instant application fails to teach of the criticality of the weight relationships in claims 2 and 11.

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Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '940 by selecting the weight ratio as recited in claims 2 and 11 since it would have provided a separator having good mechanical properties and ionic conductivity. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesche, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969).

6. Claims 3, 4, 8, 12, 13 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '940 as applied to claims 1, 7, 10, 17 and 23 above in view of U.S. patent No. 6,180,287 (Watanabe) or U.S. patent No. 6,159,389 (Miura).

The difference not yet discussed is of the particulars of the cross-linking agent.

It is known to use N,N-(1,4-phenylene)bismaleimide as a cross-linking agent (Watanabe col. 32, ll. 20-60; Miura, col. 9, ll. 27-30). The amount of the cross-linking agent being 0.01 to 50 parts per 100 parts of the polymer is preferred as an effective amount of a cross-linking agent for polymerization of the polymer (see examples of Miura and Watanabe which disclose of the amounts of cross-linking agents to the polymer).

The motivation for using the N,N-(1,4-phenylene)bismaleimide cross-linking agent of either Watanabe or Miura is that it would have provided a means for cross-linking the unsaturated regions of the polymer.

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Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '940 by selecting the N,N-(1,4-phenylene)bismaleimide cross-linking agent of either Watanabe or Miura is that it would have provided a means for cross-linking the unsaturated regions of the polymer.

7. Claims 6 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '940 as applied to claims 1, 7, 10, 17 and 23 above in view of U.S. patent No. 6,114,068 (Yamada).

The difference not yet discussed is of the amount of electrolyte relative to the polymer precursor.

Yamada teaches that the weight ratio of the polymer to the electrolyte can be anywhere from 80:20 to 5:95 (col. 7, ll. 28-32).

JP '940 also teaches that a range of weight ratios of polymer to electrolyte can be used (see paragraph [0017]).

The motivation for using a weight ration within the range of Yamada is to provide a polymer sheet having good ionic conductivity.

The instant application teaches that it is understood that other contents and weights of the electrolyte relative to the polymer precursor can be used (see paragraph [0039]). Thus it would appear that the particular claimed weight proportion in claims 6 and 15 is not a critical limitation and can be optimized accordingly.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '940 by selecting the



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weight ratio of the electrolyte and polymer as taught by Yamada since it would have provided a separator having good ionic conductivity. Adjusting the amount of electrolyte to the precursor optimizes the ionic conductivity of the separator and one of ordinary skill in the art would have found such adjustments to be obvious. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesche, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969).

8. Claims 9 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '940 as applied to claims 1, 7, 10, 17 and 23 above in view of EP 0838487 A2 (EP '487).

The difference not yet discussed is the polymerizing temperature.

The polymer of JP '940 is held to be an obvious variant from the instant claimed polymer precursor as discussed above.

Since the polymer precursor is similar, it would have been obvious to employ any temperature capable of polymerizing the precursor.

The motivation for selecting the temperature from 60-100° C is to effectively polymerize the polymer electrolyte precursor materials.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '940 by selecting the temperature from 60-100° C since it would have effectively polymerized the polymer electrolyte precursor materials.

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9. Claims 16, 20 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP '940 as applied to claims 7, 10 and 23 above in view of U.S. patent No. 5,641,565 (Sogo).

The differences not yet discussed are of the particulars of the separator.

Sogo discloses a polyethylene/polypropylene separator having a minimum thickness of 10 microns and a porosity of 40-85 % (abstract as applied to claims 16, 20 and 24). The polymer electrolyte is impregnated into the pores of the separator making the separator ionically conductive.

The motivation for using the separator of Sogo is that it provides a separator having excellent mechanical properties, enhanced battery safety properties while still having excellent conductivity.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '940 by using the separator of Sogo since it would have provided a separator having excellent mechanical properties, enhanced battery safety properties while still having excellent conductivity.

10. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP '940 as applied to claim 7 above in view of Miura.

The difference not yet discussed is of providing a polymerization starter and catalyst to facilitate crosslinking.

The claim does not require that the starter and catalyst have to be two distinct compounds. In addition the instant application only exemplifies one starter and one

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catalyst and teaches that other, but unspecified, materials can be used (see paragraph [0033])

Organic peroxide initiators such as benzoyl peroxide is known in the art so as to initiate polymerization (col. 8, ll. 1-27). The initiator is both a starter and catalyst for the polymerization.

The motivation for adding benzoyl peroxide to the polymer precursor is to enhance the initiation of the polymerization.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of JP '940 by using an benzoyl peroxide as a starter and catalyst since it would have enhanced the initiation of the polymerization.

### ***Double Patenting***

11. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

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12. Claims 1-15, 17-20 and 22-23 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims of U.S. Patent No. 6632,571 (Noh). Although the conflicting claims are not identical, they are not patentably distinct from each other.

Noh claims a polymer gel electrolyte, method of making a polymer gel electrolyte, lithium battery and method of making a lithium battery comprising the claimed polymer has the same monomer constituents in the same mole ratios (formulas 1-3) as recited in the terpolymer of claims 1, 10, 17 and 23, a lithium salt and non-aqueous organic solvent (see Noh, claims 1, 7, 8, 16, 23, 37 and 38 as applied to claims 1, 10, 17 and 23).

The molar ratios of the constituents as defined in the claims arrives at a polymer molecular weight within the range of claims 2 and 16 (claim 10 as applied to claims 2, 11 and 16).

The cross-linking agent is N,N-(1,4-phenylene)bismaleimide (claims 5, 23, 35 and 45 as applied to claims (3, 4, 8, 12, 13, and 18).

The non-aqueous solvent genus has overlapping solvents in the same part by weight (claims 1, 6, 7, 14, 16, 32 and 37 as applied to claims 5, 6, 14 and 15).

The claimed method polymerizes the constituents at an overlapping range (claim 26, 36 and 48 as applied to claims 9 and 19).

The electrolyte precursor is proved on a resin separator and polymerized (claims 16 and 31 as applied to claim 20).

A polymerization starter and catalyst are provide to facilitate crosslinking (claims 21 and 22 as applied to claim 22).

The difference between instant claims 1, 10 17 and 23 and Noh is that Noh does not show the linking of the polymer formulas 1-3 in the manner shown in the instant claims.

The monomers will crosslink with each other during polymerization and at least a portion of the polymerized constituents will have the same structural formula as that shown in the instant claims (with respect to formula 1).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made that the claimed invention of Noh would obviously result in the same product and process steps set forth in the instant application and as such are obvious variants.

13. Claim 16 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-48 of Noh as applied to claim 10 above and in further view of U.S. patent No. 5,579,659 (Morigaki) or Sogo.

The teachings of claim 10 with respect to Noh have been discussed above and are incorporated herein.

Noh claims a polyethylene insulating resin sheet (claim 31).

The difference not yet discussed is of the resin sheet having a particular porosity and thickness.

Morigaki discloses that a microporous polyethylene membrane having a porosity of 60%, and thickness is 20-22 microns (see Example 2).

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Sugo discloses a similar separator as discussed above and incorporated herein.

Selection of the porosity and thickness therein provides a separator having both excellent conductivity due to the optimal thickness and porosity while having sufficient mechanical strength.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Noh by selecting the separator to be a resin sheet having a porosity of 60% and a thickness of 20-22 microns since it would have provided a separator having both excellent conductivity due to the optimal thickness and porosity while having sufficient mechanical strength.

14. Claim 21 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-48 of Noh as applied to claim 7 above and in further view of JP '940.

The teachings of claim 7 with respect to Noh have been discussed above and are incorporated herein.

The difference not yet discussed is of forming the polymer on a support and then peeling the polymer film from the support film.

JP '940 teaches that it is known in the art to form the polymer on release paper, attach the electrolyte to the electrode and remove the release paper from the electrolyte (paragraph [0030]-[0031]).

The motivation for using this process is to uniformly imprint the solid-polymer-electrolyte on the electrode.


Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Noh by forming the polymer on a support and then peeling the polymer film from the support film since it would have provided a means for uniformly imprinting the electrolyte on the electrode.

### ***Conclusion***

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is (703) 305-0635. The examiner can normally be reached on Monday through Thursday from 8:00 a.m. to 5:30 p.m. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan, can be reached on (703) 308-2383. FAX communications should be sent to the appropriate FAX number: (703) 872-9311 for After Final Responses only; (703) 872-9310 for all other responses. FAXES received after 4 p.m. will not be processed until the following business day. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Gregg Cantelmo  
Patent Examiner  
Art Unit 1745

gc



October 19, 2003